DOCUMENT RESUME

ED 278 112 EA 019 109

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TITLE Teacher Competency: New Perspectives on Grade Level and Subject Area Variables.
PUB DATE Apr 86
NOTE 48p.; Paper presented at the Annual Meeting of the American Educational Research Association (67th, San Francisco, CA, April 16-20, 1986). Appendix contains small print.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Administrator Attitudes; *Competence; Elementary Secondary Education; Factor Analysis; Influences; *Instructional Program Divisions; *Intellectual Disciplines; State Surveys; *Teacher Attitudes; Teacher Effectiveness; Teacher Evaluation
IDENTIFIERS Connecticut; *Teacher Competencies

ABSTRACT

Data from a 1984 study undertaken to validate 15 teacher competencies for Connecticut's Beginning Teacher Support Program were reanalyzed to determine whether the competencies were applicable to all teachers or were specific to grade levels or subject areas. The original study examined 1733 responses to a survey that asked teachers and administrators to rank the importance of 15 competencies and 70 competency indicators according to their importance as measures of teacher effectiveness. Factor analysis of the data permitted clustering 57 competencies and indicators into 12 constructs. The reanalysis involved comparing the responses of elementary teachers and administrators with those of high school teachers and administrators. The study also compared the responses of high school English teachers with those of high school mathematics teachers. Principal components factor analysis with oblique rotation revealed that the constructs were essentially common across grade levels and subject areas, that the differences that were found did not pose problems of practical significance for teacher evaluation programs using the competencies, but that operational definitions did appear to differ among the comparison groups and deserved careful consideration. Tables display the data, and an appendix presents the complete list of competencies and the reconfiguration of the 57 constructs. (PGD)

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Teacher Competency: New Perspectives on Grade Level and Subject Area Variables

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A paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, California, April 1986.

EA 019 109

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Abstract

This re-analysis of the data from Streifer (1984) was conducted to further explore for subject area and grade level differences among the teaching competencies validated for Connecticut's Beginning Teacher Support Program. This study compared factor structures of selected sample groups extracted from responses to a question asking validation sample respondents to rate teaching competencies as to their importance as measures of teacher effectiveness. Sample groups included elementary and high school educators for grade level comparison and secondary English and mathematics teachers as the subject area comparison. Using exploratory factor analysis, this study was designed to determine whether the resultant constructs for each group differed in any practical and significant manner. The variables factor analyzed were only those extracted in the original validation study's factor analysis thereby ensuring a link between the two studies. As a result of this study, it was concluded that contextual differences do not exist for the generic competencies but do appear for many of these competencies at the operational definition level. This finding is important for state agencies which use generic competencies for teacher certification and licensure programs as well as school districts like Barrington who are utilizing teaching competencies as criteria for their teacher evaluation programs.

Teacher Competency: New Perspectives on Grade Level and Subject Area Variables

Philip A. Streifer

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Due to increasing national interest in teacher evaluation and competency, this research was conducted to further explore whether those competencies validated for the Connecticut State Department of Education's (CSDE) Beginning Teacher Support Program are perceived by practicing educators as being subject or grade level specific. Using exploratory factor analysis, data from Streifer (1984) were re-analyzed to determine if the resultant factor structures between comparison groups differed in any practical and significant manner. Drawing upon the process-product literature which indicates that correlates of effective teaching are specific to grade level and subject area (Gage 1979, Brophy & Good 1986), and in contrast to the recent movement toward validation of generic teaching criteria for certification and licensure programs (Capie 1980, Wilson 1980, Streifer 1984), this study has concluded that the operational definitions for many of the generic competencies differ across varying contexts. Generic criteria remain a useful tool for broadly defining the scope of effective teaching behavior. However, when many of these behaviors are applied to actual teaching, their operational definition will change across contextual situations. Finally, this study has reaffirmed that among the generally established set of broad teaching criteria, some skills are truly generic across comparison groups, that is, no difference in operational definition was found.

BACKGROUND

In 1984, the Connecticut Department of Education validated a set of generic teaching criteria for use in their Beginning Teacher Support Program (Streifer 1984) as did Florida (Wilson 1980) and Georgia (Capie 1980). The Connecticut validation study tested for subject and grade level differences having concluded from the process-product literature that such differences exist (Brophy & Evertson 1976, Medley 1977, Peterson & Walberg 1979, Gage 1979). At the time, statistical differences found among comparison groups were dismissed after discussions with State Department of Education personnel because these differences were extremely small and posed no practical implications for teacher training and evaluation programs. However, process-product research continues to indicate that contextual differences in effective teaching behavior exist (Brophy & Good 1986).

To understand this apparent conflict between the validation of generic teaching competencies by states and the process-product research, it is useful to explore the specificity of the behaviors under consideration. The competency movement grew out of an effort by state legislatures and Departments of Education to determine generic teaching criteria that could be used to strengthen teacher training and certification programs (Vlaanderen 1981). However, states wishing to strengthen their teacher certification programs were faced with a dilemma in the late seventies and eighties. While process-product research had identified many discrete skills that were moderately correlated with student achievement, cause and effect had not been established.

Therefore, states had to turn away from process-product research to the validation of criteria through professional consensus. Using this validation procedure, at least three states, Florida, Georgia and Connecticut adopted generic teaching criteria for use in training and certification of teachers (Capie 1980, Wilson 1980, CSDE 1984).

The methodologies used by these states were very similar. First item content validity was established by panels of experts. Initial content validation included review of the teaching effectiveness literature - most notably the process-product literature. Having compiled a list of teaching behaviors, items were submitted to panels of experts for review and clarification. Following this, revised items were submitted to large samples of practicing educators for further content validation. The Equal Employment Opportunity Commission (EEOC) had approved this technique as an acceptable methodology in validating criteria for licensure and certification programs (U.S. Department of Health, Education and Welfare, 1977). In this manner, Georgia validated 14 competencies (Capie 1980), Florida 22 (Wilson 1980), and Connecticut 15 competencies (CSDE 1984). All three states validated generic competencies, that is, teaching competencies that would be applied across all contextual situations. In all three cases, the generic competencies were defined to only one level. These definitions were referred to as indicators, that is, suggestions as to the interpretation and meaning of the broad generic competency. Upon review of these generic competencies and indicators, it becomes clear that they tend to be very general statements of teaching behavior. The problem with these broad competency statements is that they require more specific operational definitions, a problem recognized both by Dade County Florida

(Dade County Public Schools, 1984) and Georgia in the publication of their revised competency list (Georgia Department of Education, 1984). In these two cases, the teaching competencies include at least two additional levels of definition beyond the familiar indicator for each teaching behavior.

The difficulty encountered by the competency movement, especially as it relates to teacher certification and licensure, was that the generic competencies or constructs were too broadly defined to be applied across all classroom contexts. As these broad generic constructs were put into practice, a need arose for more explicit definitions. The result, at least in Georgia and Dade County Florida, was the development of descriptors and commentary for each of the broad competencies.

As to whether generic teaching criteria exist, the issue centers around their specificity or level of their definition. As broad constructs first isolated through process-product research and later validated through professional consensus, there does exist a definable set of generic teaching criteria. However, these generic behaviors are not sufficiently defined for use in actual practice, hence, they are being further operationally defined. It is at this level that contextual differences may become apparent. As teaching competencies are adopted and operationalized by local and state agencies for teacher evaluation, certification and licensure programs, this study indicates that contextual differences should be considered.

In the case of the Connecticut Teaching Competencies, each generic behavior is operationally defined by a set of indicators. In total, there

are 15 competencies defined by 70 indicators. Streifer (1984) factor analyzed these 85 items to determine which underlying constructs existed and whether they could be explained by fewer items. His factor analysis yielded 12 constructs explained by 57 items (see Appendix for listing of the Connecticut Teaching Competencies and results of the factor analysis grouped by major performance category). These 12 constructs or factors were related to the teacher effectiveness literature thereby assuring construct validity (Streifer & Iwanicki 1985). The re-analysis of the data reported in this paper was an attempt to determine if these same 12 constructs would emerge across varying contexts and whether they would be generic to grade level and subject area. Using exploratory factor analysis, this study concluded that in practical terms, the broad generic constructs reported in Streifer & Iwanicki (1985) are generic to at least the grade levels and subject areas tested. However, it was also found that many of the indicators scattered across these generic constructs. This would support the need for more specificity as these constructs are operationalized across varying contextual situations.

METHODOLOGY

This study re-analyzed the data from Streifer (1984) to determine if contextual differences exist for the teaching competencies validated for the Connecticut State Department of Education's Beginning Teacher Support Program. The original Connecticut validation study tested for grade level and subject area differences for each competency and indicator using analyses of variance. As that study progressed, it was important to

distinguish between statistical and practical significance when comparing groups of educators' responses for each of the 85 competencies and indicators. While a number of statistical differences did result when comparing grade levels (elementary, middle and high school) and subject areas (secondary mathematics and English), the mean value for groups tended to be very similar and fall into the same response category. Through discussions with Connecticut State Department of Education personnel at that time, it was decided that such statistical differences were not of sufficient magnitude to be of practical importance. The purpose of this re-analysis was to better understand the nature of those statistical differences and to determine how different grade level and subject area teachers make operational the generic teaching constructs.

Specifically, the data included a state-wide survey of 2743 Connecticut public school teachers' and administrators' responses to a question asking them to rate 85 teaching competencies and indicators concerning their importance as measures of teacher effectiveness. To address the issues of grade level specificity, a stratified proportional random sample of all Connecticut elementary, middle and high school teachers and principals was drawn. In addition, a separate sample of secondary English and mathematics teachers was drawn to examine whether the competencies and indicators were viewed as subject area specific. Of the 1760 surveys returned, 27 were unusable. The 1733 usable surveys represent a return rate of 63%. For the purpose of this re-analysis, comparison groups were limited to elementary verses high school as the grade level comparison and secondary mathematics verses secondary English for the subject area comparison.

Using exploratory factor analysis, this study was designed to determine whether the resultant constructs for each comparison group differed in any practical and significant manner. To ensure a link between the earlier study (Streifer 1984) and this re-analysis, only those items that loaded on the factor structure from Streifer (1984) were used as variables. In the earlier study, Streifer performed a principal components factor analysis with oblique rotation on the large sample of all Connecticut teachers and principals. The sample included responses by elementary, middle and high school teachers and principals (n=1299). Analysis yielded twelve factors (two additional factors were dropped because of insufficient item loadings) explained by 57 of the original 85 items. Each of the twelve retained factors were related to the literature on teacher effectiveness assuring construct validity. These twelve factors re-grouped by major performance category are:

Planning:
- I. Plans Effective Instruction

Instruction:
- II. Uses a Varied Teaching Style
- III. Maintains Effective Teacher/Student Interaction
- IV. Maintains a Positive Learning Environment
- V. Maintains a Productive Learning Environment
- VI. Maintains Fair and Consistent Discipline

Student Evaluation:
- VII. Selects or Creates Effective Evaluation Techniques

Professional Knowledge:
- VIII. Demonstrates Knowledge of the Subject Matter
- IX. Demonstrates Knowledge of Learning Psychology Applicable to School Age Children
- X. Demonstrates Knowledge of School Law

Professional Responsibilities:
- XI. Demonstrates Professional Behavior
- XII. Maintains Effective Parent/Community Communication

. In designing this re-analysis, it was logical to use only the 57 items loading on the original factor structure because the goal was to determine how those twelve constructs realigned, if at all, across comparison groups. Therefore, separate principal component factor analyses with oblique rotation were performed on the 57 items for each group. All analyses were performed using the Factor Procedure and Promax rotation from the Statistical Analysis System (SAS). Factor structures were extracted for each of the following sample groups: elementary teachers and administrators (n=569); high school teachers and administrators (n=348); secondary English teachers (n=203) and; secondary mathematics teachers (n=231). The resulting factor structures were compared (elementary verses high school and English verses mathematics) to determine which factors were similar and which were different. Those factors which differed across groups were reviewed to determine if these differences should be considered as significant and important.

DISCUSSION

Elementary verses High School Comparison. Principal components factor analysis with oblique rotation was performed on the elementary (n=569) and high school (n=348) teacher and principal samples. Variables factor analyzed were the 57 items that loaded on the factor matrix presented in Streifer (1984). Table 1 presents the resultant factor matrices for these two comparison groups. In this case, as with all analyses, only factor loadings equal to or greater than .40 were retained.

Table 1

Elementary and High School Factor Matrix
Principal Components Analysis with Oblique Rotation

	Elementary											High School								
Factor:	1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	7	8	9	10
Competency																					
2							77				I				80						
2.1							78				I				82						
2.2							79				I				74						
2.3							70				I				65						
3				67							I						76				
3.1				72							I						77				
3.2				67							I						75				
3.3				62							I						48				
4				71							I						55				
4.2				72							I										
4.3				60							I										
5					67						I				69						
5.1					89						I				81						
5.2					90						I				81						
5.3					83						I				73						
6.3								68			I										68
6.4								78			I										73
6.5								76			I										67
7									80		I	54									
7.1									82		I									62	
7.2									74		I					58					
7.5			60								I	65									
7.7			68								I	65									
8			72								I	67									
8.1			66								I	72									
8.2			74								I	80									
8.3			72								I	79									
9			70								I	71									
9.1			62								I	70									
10.1										71	I							74			
10.2										64	I							57			
10.3										65	I							78			
11.2		72									I		69								
11.3		61									I		74								
11.4		70									I		60								
11.5		79									I		75								
11.6		70									I		67								
11.7		77									I		71								
12.1		75									I		62								
12.2		60									I		63								
12.3		70									I		64								
13.1						73					I									69	
13.2						77					I									58	
13.3						70					I	64									
13.4						78					I									74	
14	53										I						77				
14.1	66										I						58				
14.2	72										I						73				
14.3	63										I						68				
14.4	60										I						64				
15	73										I		83								
15.1	75										I		79								
15.2	73										I		82								
15.3	72										I		74								
15.4	73										I		68								
15.5	69										I		72								
15.6	69										I		65								

As a result of this analysis, ten factors were retained for both the elementary and high school groups. The elementary factor structure explained 34.7% of the variance while the high school factor structure explained 35.6% of the variance.

The named factors for the elementary and high school groups are presented in Table 2. All of these renamed factors can be related to the literature on teacher effectiveness (Streifer & Iwanicki 1985) thereby ensuring their construct validity.

Table 2

Names of the Factors Derived Through the Principal Components Factor Analysis with Oblique Rotation

Elementary and High School Factor Structure

	Elementary		High School
I.	Engages in Professional Growth and Demonstrates Responsibility	I.	Maintains a Positive Learning Environment
II.	Effectively Evaluates Students' Needs and Progress	II.	Effectively Communicates with and Involves Parents
III.	Maintains a Positive Learning Environment	III.	Effectively Evaluates Students' Needs and Progress
IV.	Exhibits Professional Knowledge	IV.	Demonstrates Effective Planning Skills
V.	Demonstrates Effective Planning Skills	V.	Demonstrates Knowledge of the Subject Matter
VI.	Maintains Effective Discipline	VI.	Exhibits Professional Knowledge
VII.	Demonstrates Knowledge of the Subject Matter	VII.	Demonstrates Professionalism
VIII.	Uses a Varied Teaching Style	VIII.	Maintains a Productive Learning Environment
IX.	Demonstrates Effective Communication Skills	IX.	Maintains Effective Discipline
X.	Maintains a Productive Learning Environment	X.	Uses a Varied Teaching Style
		XI.*	Demonstrates Knowledge of School Law

* Factor Initially Dropped but Later Retained

Comparison of the named factors from both the elementary and high school factor matrices clearly indicates a great deal of similarity. These broad constructs should be considered generic teaching competencies. However, as will be pointed out in a later section, important differences do emerge between grades among the item loadings for similar constructs indicating subtle differences in operational definition.

Inter-Factor correlations are presented in Tables 3 and 4. For ease of interpretation, only inter-factor correlations equal to or greater than .40 are included. The data indicates a number of moderate correlations between factors for both the elementary and high school groups. However, upon examining the factors and their item stems, none of these correlations were considered to be of any practical importance in interpreting the results.

Table 3

Inter-Factor Correlations
Elementary Group

Factor	I	II	III	IV	V	VI	VII	VIII	IX	X
I		52	45	47						
II	52		47	43	44	43		42		
III	45	47		45	42	48				
IV	47	43	45							
V		44	42							
VI		43	48							
VII										
VIII		42								
IX										
X										

Table 4

Inter-Factor Correlations
High School Group

Factor	I	II	III	IV	V	VI	VII	VIII	IX	X
I		44	42							
II	44		41			40				
III	42	41								
IV										
V										
VI		40								
VII										
VIII			40							
IX										
X										

The loadings for each of the ten factors from the sample groups were then compared in a salience table to determine if the factor structures were similar of different. This comparison is presented in Table 5 below.

Table 5

Salience Table of Factor
Loadings between the
Elementary and High School Sample Groups

(High School)	I	II	III	IV	V	VI	VII	VIII	IX	X	(Elementary)
I			8			1			1		
II	7										
III		9									
IV				4							
V							4		1		
VI				5							
VII											
VIII	5									3	
IX									1		
X								3			
XI				2		3					

Table 5 indicates that the factor loadings for three of the ten factors are truly salient across elementary and high school grade levels. Those factors having the same item loadings across groups were elementary factor II and high school factor III, elementary factor V and high school factor IV and elementary factor VIII and high school factor X. These three factors have been named: Effectively Evaluated Students' Needs and Progress, Demonstrates Effective Planning Skills, and Demonstrates Knowledge of the Subject Matter. Clearly these three constructs are generic across grade level as Table 5 indicates they are operationally defined in the same terms by both elementary and high school educators. This is an important finding that has implications for the development of teacher evaluation, certification and licensure programs.

In contrast, Table 5 also indicates that the item loadings on the remaining seven factors were not completely salient. For these seven factors, the loadings scattered somewhat even though the named constructs are similar. Upon careful review, this scattering points out some potentially important differences as to how each of the two groups operational define the generic constructs. In some cases, however, differences are dismissed as lacking any importance.

Discussion of Potential Differences. A difference appears to exist for the factors concerned with parental involvement (elementary factor I and high school factor II). While six factor loadings were the same between groups describing the importance of parent involvement, five additional items loaded on the elementary factor dealing with professional growth and responsibility. These five items loaded on a separate high school factor

independently (factor VII) named "Demonstrates Professionalism." This may indicate a difference between the two groups as to how they view professionalism and parent involvement. Clearly, both groups agree on the importance of keeping parents informed and utilizing community resources. However, because the correlation between the two high school factors was low (r=.24), it appears that high school educators view the two constructs as separate and distinct competencies whereas the elementary group views them as linked under the broad rubric of professionalism. This difference will become important as school systems and state departments of education develop evaluation instruments and operational definitions for the generic competency of professionalism.

For the factor named "Maintains a Positive Learning Environment" (elementary factor III and high school factor I), all factor loadings were the same but two. The high school factor added items 7.0 and 13.3 concerning communication with students and promoting positive interpersonal relations based upon mutual respect. However, these two items, when compared to the other eight loadings do not in fact indicate any major difference. Therefore, this construct should be considered generic across grade level.

A difference in interpretation of one item appears in the factor concerned with knowledge of subject matter (elementary factor VII and high school factor V). Both groups had four identical factor loadings dealing with knowledge of the subject matter. However, one additional item loaded on the high school factor, item 7.2, describing use of acceptable written and oral language. This would indicate that high school educators

operationally define knowledge and presentation of the subject matter as including proper use of language. This is understandable as subject matter becomes much more complex at the high school level requiring especially clear and correct explanations. Moreover, a high school teacher who does not use acceptable written and oral expressions most probably would be open to severe criticism by his students unlike the elementary teacher using the same poor language. This same item loaded with two others, 7.0 and 7.1, as a separate factor for the elementary group named "Demonstrates Effective Communication Skills." However, in this case, the item is included as a further description of the more generic construct concerned with communication skills - not tied to subject matter.

In the case of the generic construct dealing with professional knowledge (elementary factor IV and high school factor VI), both factors include items concerned with learning psychology, teaching styles and school law. In the elementary case, two additional items loaded having to do with school law and district organization. This may indicate a concern on the part of elementary educators over the rights of students and parents and how they are effected by organizational changes in the district. However, these same two items loaded on high school factor XI which was dropped because it failed to meet the minimum criterion of three item stems to retain the factor (Kerlinger 1973). Assuming this factor had been retained, an argument could be made that school law is a major interest for high school educators whereas elementary educators view it as within a generic competency encompassing professional knowledge. Upon careful consideration, this researcher would adopt the latter view, that

these two items represent a major concern that effects the every day life of high school educators. If this view is accepted, it will have a significant impact on the development of evaluation instruments and professional preparation programs for high school teachers and administrators.

The final area of potential difference occurred for the generic construct concerned with student discipline. In the elementary case (factor VI) four items loaded all dealing directly with maintaining fair and consistent discipline. One of these items, 13.3, addresses the need to promote positive interpersonal relations based upon mutual respect. While clearly related to effective discipline, this item did not load for the high school factor (factor IX). Instead, item 7.1 loaded describing the importance of providing clear and logical directions and explanations. This difference, while subtle, may be important. From an elementary perspective, effective discipline encompasses the development of positive interpersonal relations while at the high school level it incorporates providing clear and logical directions and explanations. For the purposes of designing teacher evaluation and certification programs, this difference in operational definition is an important consideration.

Mathematics verses English Comparison. In a similar fashion to the grade level comparisons, principal components factor analysis with oblique rotation was performed on the secondary mathematics (n=231) and English (n=203) samples. Variables factor analyzed were the 57 items that loaded on the factor matrix presented in Streifer (1984). Table 6 presents the resultant factor matrices for these two groups. Only factor loadings with values equal to or greater than .40 were retained.

Table 6

English and Mathematics Factor Matrices
Principal Components Analysis with Oblique Rotation

	English														Mathematics											
Factor:	1	2	3	4	5	6	7	8	9	10	11	12	13	14		1	2	3	4	5	6	7	8	9	10	11	12
Competency															I										71		
2													87		I										81		
2.1											70				I										49		
2.2											72				I	53											
2.3				50											I	73											
3				83											I	76											
3.1				78											I	77											
3.2				73											I	76											
3.3				63											I	76											
4				58											I	72											
4.2								60							I	63											
4.3								53							I			52									
5			65												I			90									
5.1			89												I			89									
5.2			90												I			86									
5.3			79												I												58
6.3						66									I										77		
6.4						75									I										71		
6.5						56									I								79				
7										59					I								83				
7.1										73					I								70				
7.2	46														I												76
7.5					52										I		78										
7.7						70									I		80										
8					60										I		75										
8.1					69										I		82										
8.2						80									I		67										
8.3						75									I		75										
9					75										I										57		
9.1					55										I				77								
10.1		84													I				71								
10.2		71													I				57								
10.3		65													I							65					
11.2								74							I										49		
11.3								65							I												
11.4								59							I				57								
11.5														55	I							48					
11.6		57													I				66								
11.7			56												I							76					
12.1									69						I							68					
12.2									71						I							70					
12.3									68						I					76							
13.1		54													I					80							
13.2					75										I					66							
13.3					81										I					80							
13.4												49			I							77					
14		60													I							72					
14.1					63										I							73					
14.2		59													I							76					
14.3		71													I							49					
14.4												78			I												
15	72														I		73										
15.1	78														I		79										
15.2	81														I		80										
15.3	73														I		76										
15.4	77														I		75										
15.5	75														I		76										
15.6	71														I										63		
															I												

Table 6 indicates that nine factors were initially retained for the English group while eleven factors were retained for the mathematics group. The English factor structure explained 39.6% of the variance while the mathematics factor structure explained 38% of the variance.

The retained factors for both the mathematics and English groups are named and presented in Table 7 below. All of these renamed factors can be related to the literature on teacher effectiveness (Streifer & Iwanicki 1985) thereby ensuring their construct validity.

Table 7

Names of the Factors Derived Through Principal Components Factor Analysis with Oblique Rotation

English and Mathematics Factor Structures

	English		Mathematics
I.	Effectively Communicates with and Involves Parents	I.	Exhibits Professional Knowledge
II.	Maintains an Organized and Productive Classroom and Work Style	II.	Effectively Involves Parents
III.	Demonstrates Effective Planning Skills	III.	Maintains a Positive Learning Environment
IV.	Exhibits Professional Knowledge	IV.	Demonstrates Effective Planning Skills
V.	Promotes Individualization and Self Growth	V.	Maintains a Productive Learning Environment
VI.	Maintains a Positive Learning Environment	VI.	Maintains Effective Discipline
VII.	Uses a Varied Teaching Style	VII.	Demonstrates Professionalism
VIII.	Effectively Evaluates Students' Basic Skills and Knowledge	VIII.	Meets the Needs of Special Students
IX.	Meets the Needs of Special Students	IX.	Demonstrates Effective Communication Skills
X.*	Demonstrates Effective Communication Skills	X.	Demonstrates Knowledge of the Subject Matter
XI.*	Demonstrates Knowledge of the Subject Matter	XI.	Uses a Varied Teaching Style

* Factor Initially Dropped but Later Retained

Comparison of the named factors from both the English and mathematics groups indicates less similarity than was the case between the elementary and high school groups. Nevertheless, there are constructs that emerge as generic across subject area. These include the areas of planning, maintaining a positive learning environment, involving parents, professional knowledge, discipline, maintaining a productive learning environment, and use of a varied teaching style. Differing constructs appear to be in realm of special students' needs, knowledge of subject matter, communication skills, and individualization. These similarities and differences will be more fully explained below.

Inter-Factor correlations were examined to determine if retained factors for each group were related to one another. Tables 8 and 9 present the inter-factor correlations for each sample group. For ease of interpretation, only inter-factor correlations equal to or greater than .40 are included. The data presented in these two tables indicate a number of low correlations between factors. However, upon examining the factors and their item loadings, only one of these correlations was considered to be of any practical importance in interpreting the results. This occurred between English factors V and VI ($r=.43$) both of which concern the area of developing and maintaining a positive learning environment. The following section will more fully explain the impact of this inter-factor correlation.

Table 8
Inter-Factor Correlations
English Group

Factor	I	II	III	IV	V	VI	VII	VIII	IX
I		41			42				
II	41								
III									
IV									
V	42					43			
VI					43				
VII									
VIII									
IX									

Table 9
Inter-Factor Correlations
Mathematics Group

Factor	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
I											41
II							41				
III											44
IV											42
V											
VII											
VII		41									
VIII											41
IX											
X											
XI	41		44	42				41			

To further explore the similarities and differences between the comparison groups, factor item loadings from the English group were compared to its counterpart's from the mathematics group in a salience table. Table 10 presents these data which clearly indicate a scattering of the items across many factors.

Table 12

Salience Table of Factor
Loadings between the
English and Mathematics Sample Groups

English	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Math
I		6							1		1		
II					3	1	3	1					
III				4	1								
IV	6												
V			3			2	1						
VI			3								1	1	
VII											3		
VIII								1			1	1	
IX	2												
X									2				
XI								3		2			
XII						1	1						
XIII										1			
XIV					1								

Upon reviewing the salience table, it would appear there were no constructs generic to both subject areas because the items scattered over many factors. That is, there were no factors with completely common items for both the English and mathematics groups. However, when the actual item stems are studied, a different picture emerges. As stated before, when reviewing the named constructs there are constructs that appear to be generic across subject area. These include the areas of planning, maintaining a positive learning environment, involving parents, professional knowledge, discipline, maintaining a productive learning environment, and use of a varied teaching style. The salience table indicates however, that these "generic" constructs may be operationally defined somewhat differently by each group.

Discussion of Potential Differences. One construct that appears to be generic across both groups is the area of professional knowledge. Five items loaded on both the English and mathematics factors dealing with subject matter, learning psychology, learning styles and school law. Two additional law related items, 4.2 and 4.3, loaded on the mathematics factor. This may indicate that mathematics teachers are more concerned than English teachers with how district organization and individual rights affects them. Given the nature of the two subject areas, mathematics being much more concrete and sequential than English, mathematics teachers may feel more subject to accountability, hence their greater concern for these two items.

Both factor matrices include a factor dealing with parent involvement. Upon review, the construct is very similar for both the English and mathematics teachers except that the English teachers added one item, 7.2, use of proper language. This is understandable as English teachers would be especially concerned with proper English usage in the public forum.

English and mathematics teachers agree on the concern for maintaining a positive learning environment. However, English teachers split out these items across two factors (factors V and VI), the former renamed as "Promotes Individualization and Self Growth." Since the inter-factor correlation between these two factors is moderate ($r=.43$), it should not be concluded that a major difference exists between both groups. However, English teachers appear more concerned with individualization, self-discipline and self-growth as indicated by the items 9.1, 13.2 and

14.1. It is also important to note that English teachers included with this factor items concerned with student discipline indicating they view discipline and positive learning environment as being linked. Unlike the mathematics teachers, the English group did not have a separate factor concerned with only student discipline. These issues will be important when designing teacher evaluation programs for both groups.

In the area of planning, both factor structures included essentially the same items except that English teachers included item 11.7. This item deals with evaluating students based on criteria aligned to the objectives. The loading of this item (.56) was not among the higher loadings for this factor, therefore it should not be concluded that any major difference in operational definition exists between groups.

For the construct dealing with organization, there was a great deal of scattering as noted on Table 12 between English factor II and mathematics factor V. The English factor transcended classroom organization and time on task to the overall school environment as indicated by items 11.6 maintaining records, 14.0 meeting professional responsibilities, 14.2 working cooperatively with colleagues and administration and 14.3 following district policies and curricula. Because of this, the English factor was named "Maintains an Organized and Productive Classroom and Work Style." On the other hand, mathematics teachers included items 11.5 selects procedures for student evaluation and 11.7 evaluates students on criteria aligned to the objectives with this factor. It seems clear that the English and mathematics teachers are operationally defining this construct differently. English teachers are

defining organization as being important in terms of the classroom and work place while mathematics teachers are defining it as encompassing the classroom and important for designing effective student evaluation procedures.

In the area of student discipline as was pointed out earlier, English teachers linked this construct with the factor concerned with developing a positive learning environment (factor V). One additional discipline related item (13.1) was included on the English factor dealing with classroom organization. In contrast to this scattering, the mathematics factor structure contains a separate factor concerning only with discipline (factor VI). This would indicate that mathematics teachers view discipline as a discrete set of skills whereas English teachers view these same skills as linked to the establishment of a positive and productive learning environment. This is an important finding for school districts and state agencies developing teacher evaluation instruments.

Similarly, the mathematics factor matrix included a separate factor for professional responsibilities whereas the English teachers incorporated the same items into another factor. Mathematics factor VII includes items dealing with professionalism in the work place such as meeting responsibilities (14.0), involvement in self-growth and development (14.1), working cooperatively with colleagues (14.2), following district policies and curricula (14.3), and demonstrating ethical behavior (14.4). Three of these items, 14.0, 14.2 and 14.3, were included in the English factor II renamed "Maintains an Organized and

Productive Classroom and Work Style." It was the inclusion of these three items that led to the latter part of the name - "and Work Style." The final item, 14.1 which deals with self-growth and development loaded on the English factor concerned with a positive learning environment. Inasmuch as English teachers included these items with other factors modifying the constructs describing productive and positive learning environments, and the mathematics factor matrix included a separate factor concerned solely with professionalism, it can be concluded that mathematics teachers view professional activities and behavior as a discrete construct whereas English teachers view these activities and behaviors as linked to the establishment of a productive and positive learning environment. This is an important finding for school districts and state agencies developing teacher evaluation instruments because it indicates that English and mathematics teachers view professionalism and related behavior in different contexts.

Both factor matrices included a factor dealing with meeting the needs of special students. English factor IX and mathematics factor VIII included items 12.1 using information from student records, 12.2 identifying students who need specialists, and 12.3 secure help from colleagues to assist with special needs' students. In addition, the mathematics factor included items 11.2 and 11.6 having to do with diagnosing entry level skills and maintaining proper records while the English factor included items 4.2 and 4.3 both of which concern school law and district organization. Certainly in the mathematics case, items 11.2 and 11.6 are directly related to meeting the needs of special students as diagnosis of entry level knowledge/ability along with maintaining proper

records are crucial to the construct. On the other hand, items 4.2 and 4.3 which loaded on the English factor do not appear to have any significant impact on the construct's meaning. Of the five items that comprise English factor IX, these two items had the lowest factor loadings. Furthermore, a case could be made that knowledge of district organization and parents/students rights are important considerations when dealing with special needs' students given the litany of regulations and law surrounding PL 94-142. Although it would appear that these factors are different when analyzing the salience table, upon careful review of the item stems, they are in fact very similar.

The factor named "Demonstrates Effective Communication Skills" emerged on the mathematics factor matrix (factor IX) but was dropped on the English matrix because it failed to meet the minimum criterion of at least three item loadings. However, two of the three items that formed the mathematics factor (factor IX) loaded on the English matrix (factor X) which was not initially retained. If English factor X had been retained, no difference in interpretation of this construct could be made between the two groups. Reviewing both factor matrices, it should be concluded that English factor X should be retained and that the two groups are in agreement as to the importance of effective communication skills.

Precisely the same set of circumstances as exist for the previously discussed factor occurred for the construct concerned with knowledge of the subject matter. Mathematics factor X contains three items concerned with knowledge of the subject matter. Two of these three items. 2.1 and 2.2 loaded on English factor XI which was initially dropped because it

failed to meet the criterion of three loadings. As was the case earlier with the communication construct, had this factor been retained, it would be concluded that both groups place equal importance on knowledge of subject matter. Since the English factor loadings are high for these two items, .70 and .72 respectively, it must be concluded that the factor should be retained and that no difference exists between the groups.

Finally, both groups have a factor dealing with use of a varied teaching style. However, the mathematics factor (factor XI) included a number of other items that all appear to be concerned with special needs students, use of standardized testing and use of community resources in instruction. It would appear that a significant difference in operational definition exists between the two groups. This is not the case because an argument can be made for the relationship between these items and the construct. For example, use of community resources (item 15.6) and recognizing the interests of individual students (9.1) both further define how the construct is operationalized. Items 11.3 and 11.4 indicate that a varied teaching style should be based upon diagnosis of student ability and needs. Therefore, it should be concluded that no major difference exists between the groups exist for this construct.

CONCLUSIONS

This study had several significant and important findings concerning the grade and subject level specificity of the teaching competencies validated for the Connecticut Board of Education's Beginning Teacher Support Program. Furthermore, these findings will be equally important for those school districts such as Barrington that plan to utilize these teacher competencies as criteria in their teacher evaluation programs.

First it was determined that the generic constructs validated by Streifer (Streifer & Iwanicki 1985) are indeed common across grade level and subject area. This re-analysis of data has shown that the resultant constructs are essentially similar across the grade levels and subject areas analyzed. While a few minor differences between constructs appear in Tables 2 and 7, careful analysis of the items indicate that these pose no practical significance for teacher evaluation programs. However, some important differences in operational definition do apparently exist for many of the constructs across comparison groups. These differences are discussed in the presentation of the data section and summarized below. This finding, that different operational definitions for many constructs exist across groups is an important consideration for school districts planning to use these criteria for their teacher evaluation programs. Finally, this study has found that a few competencies are completely salient across comparison groups further establishing their usefulness over all contexts.

Generic Competencies Across Grade Level. This study has concluded that no grade level differences exist for the constructs concerned with planning instruction, maintaining a positive learning environment, evaluation of students' needs and progress and knowledge of the subject matter. These four constructs and their loadings were either completely salient across both groups or when analyzed, differences were dismissed as lacking significance or importance to teacher evaluation programs.

Differences in Operational Definition Across Grade Level. Differences in operational definition of many constructs were found across grade level. High school teachers view parent involvement and professionalism as two separate constructs while elementary teachers view them as linked. This may indicate that elementary teachers consider parent involvement as part of their every day professional duties while high school teachers see it as simply another duty. Regarding knowledge of subject matter, high school teachers operationally defined this construct as including proper use of language unlike the elementary teachers (as this item did not appear on the elementary factor). As stated earlier, this is not surprising because proper use of language is more crucial for a high school teacher's effectiveness than for an elementary teacher. In the area of professional knowledge, elementary teachers included items with this construct dealing with school law and district organization and policy. High school teachers on the other hand, have a separate factor (retained after discussion) in the area of school law. While school law and district policy is important to both groups, it appears that this is a significant factor for high school teachers. This is not surprising given the many legal issues that arise at the high school level. In contrast,

elementary teachers view school law and district policy within the more general scope of professional knowledge areas. Finally both groups operationally define student discipline in somewhat different terms. Modifying the basic construct, elementary teachers define discipline as including the development of positive interpersonal relations while high school teachers define it in terms of providing clear and logical directions and explanations. All of these differences will be important factors as school districts adopt teacher competencies as criteria for teacher evaluation programs.

Generic Competencies Across Subject Area. As was the case in the grade level analysis, this study did determine that certain constructs are generic across the subject areas compared. These generic constructs include planning, meeting the needs of special students, effective communication skills, knowledge of subject matter and use of a varied teaching style. While the factors appear to be different in Table 12, careful analysis reveals that differences in factor item loadings were neither significant or important to the development of teacher evaluation programs.

Differences in Operational Definition Across Subject Area. The study did find that English and mathematics teachers operationally define certain competencies or constructs in different terms. Such differences were found for the constructs concerned with professional knowledge, organization, parent involvement, maintaining a positive learning environment, student discipline, and professional responsibilities. Specifically, in the area of professional knowledge, mathematics teachers

appear to place a greater emphasis on knowledge of school law and district organization and policy than do English teachers. For the construct concerning organization, English teachers define it as encompassing both the classroom and work place, that is, important in and out of the classroom. Mathematics teachers however, operationally define it as being important in the classroom and for designing effective student evaluation procedures. In another area, parent involvement was similarly defined by both groups except that English teachers added an item concerned with proper use of language. Given their subject area expertise, it is understandable why English teachers would place a greater emphasis on proper oral and written language when interacting with the public. Regarding learning environment, English teachers differentiate between maintaining a positive learning environment and promoting individualization and self-growth whereas mathematics teachers make no such distinction. This may be a result of the nature of the subject matter, mathematics more sequential than English, thereby entailing less individualization. Another difference in operational definition occurred for the construct concerned with student discipline. English teachers tied discipline to maintenance of a positive and productive learning environment whereas mathematics teachers view discipline as a separate construct. Similarly, English teachers define professional responsibilities as including many professionally related behaviors linked to the construct dealing with maintaining a productive work environment. Mathematics teachers, however, group these behaviors together as a discrete construct. This may indicate that English teachers have a broader view of professionalism encompassing much of their work milieu whereas mathematics teachers view professionally related activities as

extra and unrelated to the learning environment. All of these differences will be important for school districts such as Barrington who are developing teacher evaluation programs and wish to utilize teacher competencies as the criteria for evaluation.

Significance. The findings of this study will be important to state agencies and school districts who are utilizing the results of large state-wide validation studies for the teaching criteria to be applied in their teacher evaluation programs. Although these state-wide validation studies indicate that teaching competencies are generic across grade level and subject area, this study has found that the operational definitions of many of these competencies are different when comparing groups. Equally important is the finding that some competencies are truly salient across groups further establishing their usefulness over various teacher groups.

Because this study analyzed only one level of definition for each competency, it will be important to further define the constructs identified as having different operational definitions and re-explore group differences. It is very difficult to precisely determine the meaning of the differences found because the items factor analyzed are themselves often broad statements of teaching behavior. Nevertheless, this study has determined that contextual differences apparently do exist for many teaching competencies and that these differences come to light at the operational definition level of the more broadly stated generic constructs. At the very least, this study indicates that further research is required to fully understand how different groups of teachers apply many of the generic teaching competencies.

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Appendix

Connecticut Competencies Categorized by Major Performance Area

. Major Category: PLANNING

Connecticut State Department of Education

*5.0 Plans instruction to achieve selected objectives

- *5.1 Identifies and sequences goals of instruction
- *5.2 Identifies and sequences objectives for instruction
- *5.3 Identifies teaching procedures and sequences learning activities
- *5.4 Selects appropriate human resources, materials and media
- *5.5 Plans instructional activities which provide for individual differences

I. Major Category: INSTRUCTION

Connecticut State Department of Education

*6.0 Effectively implements instructional plans and uses appropriate instructional techniques

- *6.1 Presents material at a level appropriate to the needs, interests, ability and background of students
- *6.2 Conducts learning activities in a logical sequence which is flexible and developmentally appropriate
- *6.3 Provides illustrations, examples and applications of the material
- *6.4 Uses a variety of instructional materials and media
- *6.5 Uses a variety of instructional methods and incorporates advancing technology
- *6.6 Uses a balance of individual, small group and large group instructional arrangements

te: Competencies denoted with an asterisk (*) were rated as being directly observable by at least 75% of the teachers and administrators comprising the validation sample.

Factor Analysis Results: Derived Competencies and Indicators Categorized by Major Performance Area

I. Major Category: PLANNING

Factor Analysis

Competency: Plans effective instruction**

- *5.2 Identifies and sequences objectives for instruction
- *5.1 Identifies and sequences goals of instruction
- *5.3 Identifies teaching procedures and sequences learning activities
- *5.0 Plans instruction to achieve selected objectives

II. Major Category: INSTRUCTION

Factor Analysis

Competency: Uses a varied teaching style

- *6.4 Uses a variety of instructional materials and media
- *6.5 Uses a variety of instructional methods and incorporates advancing technology
- *6.3 Provides illustrations, examples and applications of the material

**Note: Items are listed according to factor loading from highest to lowest values

*8.7 Provides instructional activities that foster student involvement

*8.8 Matches teaching styles and methods with the learning situation and the learning styles of students

8.9 Revises instruction on the basis of student comments, questions and performance

*7.0 Effectively communicates with students

*7.1 Provides directions and explanations in a clear, coherent and logical manner

*7.2 Uses acceptable written and oral expressions with students

*7.3 Provides for two-way communication with students throughout lessons

*7.4 Establishes rapport and fosters positive reinforcement through verbal and non-verbal communication

*7.5 Communicates personal enthusiasm and self-confidence

*7.6 Outlines expectations for students in a clear manner

*7.7 Communicates with students both individually and collectively about their needs and progress

8.0 Helps students develop positive self-concepts

8.1 Recognises and understands the worth of all students and the opportunities that racial, cultural, sexual and religious diversity present in the classroom

*8.2 Demonstrates sensitivity to and respect for the needs and feelings of all students

*8.3 Demonstrates patience, empathy and enthusiasm

Competency: Maintains effective teacher/student interaction

*7.1 Provides directions and explanations in a clear, coherent and logical manner

*7.0 Effectively communicates with students

*7.2 Uses acceptable written and oral expressions with students

Competency: Maintains a positive learning environment

*8.2 Demonstrates sensitivity to and respect for the needs and feelings of all students

*8.3 Demonstrates patience, empathy and enthusiasm

8.0 Helps students develop positive self-concepts

8.1 Recognises and understands the worth of all students and the opportunities that racial, cultural, sexual and religious diversity present in the classroom

*7.7 Communicates with students both individually and collectively about their needs and progress

9.1 Recognises and encourages the special interests and abilities of individual students

*7.5 Communicates personal enthusiasm and self-confidence

9.0 Facilitates the independence of the student as learner

Competency: Maintains a productive classroom environment

*10.1 Establishes and maintains classroom routines and procedures

*10.3 Provides a learning environment that is attractive and orderly

*10.2 Uses instructional time effectively, paces instructional activities appropriately and maximises students' time on task

9.0 Facilitates the independence of the student as learner

9.1 Recognizes and encourages the special interests and abilities of individual students

9.2 Engages students in selecting their own learning objectives and activities

*9.3 Poses probing questions that stimulate students to recall, analyze, synthesize and evaluate

*9.4 Presents opportunities that foster thinking skills and problem solving skills

9.5 Assists and encourages students to research issues and questions of concern to them

9.6 Promotes students' ability to communicate effectively with others about ideas and concerns

*10.0 Effectively organizes time, space, materials and equipment for instruction

*10.1 Establishes and maintains classroom routines and procedures

*10.2 Uses instructional time effectively, paces instructional activities appropriately and maximizes students' time on task

*10.3 Provides a learning environment that is attractive and orderly

*13.0 Establishes a positive learning environment

*13.1 Establishes and maintains appropriate behavior standards for students in the learning environment

13.2 Develops an atmosphere which fosters self-discipline

13.3 Promotes positive interpersonal relations based upon mutual respect

*13.4 Handles discipline fairly and consistently

Competency: Maintains fair and consistent discipline

*13.2 Develops an atmosphere which fosters self-discipline

*13.4 Handles discipline fairly and consistently

*13.1 Establishes and maintains appropriate behavior standards for students in the learning environment

13.3 Promotes positive interpersonal relations based upon mutual respect

II. Major Category: STUDENT EVALUATION

Connecticut State Department of Education

11.0 Effectively assesses student needs and progress

11.1 Selects appropriate materials and procedures for assessing student progress on objectives

11.2 Diagnoses entry-level skills and knowledge of students

11.3 Recognizes when students are deficient in the basic skills and provides or recommends corrective action

11.4 Uses information from system wide standardized testing, when appropriate, to plan instruction

11.5 Creates or selects evaluation instruments or procedures to obtain information for monitoring

*11.6 Develops and maintains a system for keeping group and individual records

11.7 Evaluates students on the basis of criteria that are aligned with instructional objectives

12.0 Effectively meets the needs of exceptional students

12.1 Obtains and uses information about students from available records

12.2 Identifies students who require the assistance of specialists

12.3 Obtains and uses information from colleagues to assist students with special needs

*12.4 Provides appropriate instruction to students with special needs.

III. Major Category: STUDENT EVALUATION

Factor Analysis

Competency: Selects or creates effective evaluation techniques

11.5 Creates or selects evaluation instruments or procedures to obtain information for monitoring student progress and effectiveness of instruction

11.3 Recognizes when students are deficient in the basic skills and provides or recommends corrective action

12.1 Obtains and uses information about students from available records

12.2 Identifies students who require the assistance of specialists

12.3 Obtains and uses information from colleagues to assist students with special needs

11.7 Evaluates students on the basis of criteria that are aligned with instructional objectives

11.2 Diagnoses entry-level skills and knowledge of students

11.4 Uses information from system-wide standardized testing, when appropriate, to plan instruction

*11.6 Develops and maintains a system for keeping group and individual records

V. Major Category: PROFESSIONAL KNOWLEDGE

Connecticut State Department of Education

*1.0 Demonstrates facility in the skills of reading, writing and mathematics

*2.0 Demonstrates knowledge of the subject to be taught

- *2.1 Knows and understands the major principles and concepts of the material to be taught
- 2.2 Possesses accurate and up to date knowledge of subject matter
- *2.3 Understands the purpose and value of the material to be taught
- *2.4 Is able to formulate meaningful questions about the subject matter
- 2.5 Knows appropriate sources of additional information about the material to be taught

3.0 Demonstrates knowledge of human growth and development as it relates to the teaching/learning process

- 3.1 Knows and understands the major theories of human development
- 3.2 Understands how physical, social, emotional and intellectual development relate to planning and organising instruction
- 3.3 Knows about various teaching styles and learning styles and understands their interrelationships
- 3.4 Recognises the conditions and needs of special students

4.0 Demonstrates a knowledge of the American public school system

- 4.1 Knows and understands the governance of schools from the local, state and federal levels
- 4.2 Understands how the organisation of the district and school has an impact upon the individual teacher
- 4.3 Understands the rights and responsibilities of students, parents and teachers

IV. Major Category: PROFESSIONAL KNOWLEDGE

Factor Analysis

Competency: Demonstrates knowledge of the subject matter

- 2.2 Possesses accurate and up to date knowledge of subject matter
- *2.0 Demonstrates knowledge of the subject to be taught
- *2.1 Knows and understands the major principals and concepts of the material to be taught
- *2.3 Understands the purpose and value of the material to be taught

Competency: Demonstrates knowledge of learning psychology applicable to school age children

- 3.1 Knows and understands the major theories of human development
- 3.0 Demonstrates knowledge of human growth as it relates to the teaching/learning process
- 3.2 Understands how physical, social, emotional and intellectual development relate to planning and organising instruction
- 3.3 Knows about various teaching styles and learning styles and understands their interrelationships

Competency: Demonstrates knowledge of school law

- 4.2 Understands how the organisation of the district and school has an impact upon the individual
- 4.0 Demonstrates a knowledge of the American public school system
- 4.3 Understands the rights and responsibilities of students, parents and teachers

7. Major Category: PROFESSIONAL RESPONSIBILITIES

Connecticut State Department of Education

14.0 Meets professional responsibilities

*14.1 Demonstrates responsibility for self-growth, professional improvement and on-going self-evaluation

*14.2 Works cooperatively with colleagues and administrators

*14.3 Follows the policies, procedures and curricula of the school district

14.4 Demonstrates ethical behavior

15.0 Encourages and maintains the cooperative involvement and support of parents and the community

15.1 Establishes on-going two way communication with parents based upon mutual respect

15.2 Provides opportunities for parent and community involvement

15.3 Obtains and uses information about students from parents

15.4 Communicates goals and objectives for both program and students to parents

15.5 Conducts effective parent/teacher conferences

15.6 Uses community resources in instruction

V. Major Category: PROFESSIONAL RESPONSIBILITIES

Factor Analysis

Competency: Demonstrates professional behavior

14.0 Meets professional responsibilities

*14.3 Follows the policies, procedures and curricula of the school district

*14.2 Works cooperatively with all colleagues and administration

*14.1 Demonstrates responsibility for self-growth, professional improvement and ongoing self-evaluation

14.4 Demonstrates ethical behavior

Competency: Maintains effective parent/community communication

15.2 Provides opportunities for parent and community involvement

15.1 Establishes on-going two way communication with parents based upon mutual respect

15.0 Encourages and maintains the cooperative involvement and support of parents and the community

15.3 Obtains and uses information about students from parents

15.4 Communicates goals and objectives for both program and students to parents

15.5 Conducts effective parent/teacher conferences

15.6 Uses community resources in instructions community resources in instruction